EXERCISE-1

SECTION-A [FUNDAMENTAL]

Q.1 If in two circles, arcs of the same length subtend angle 60° and 75° at the centre, find the ratio of their radii.

Q.2 Find the values of the trigonometric functions

(i) $\sin 765^\circ$ (ii) $\operatorname{cosec}(-1410^\circ)$

(iii) $\tan\frac{19\pi}{3}$ (iv) $\sin\left(-\frac{11\pi}{3}\right)$

(v) $\cot\left(-\frac{15\pi}{4}\right)$

Q.3 Prove that

(i) $\sin^2\frac{\pi}{6}+\cos^2\frac{\pi}{3}-\tan^2\frac{\pi}{4}=-\frac{1}{2}$ (ii) $2\sin^2\frac{3\pi}{4}+2\cos^2\frac{\pi}{4}+2\sec^2\frac{\pi}{3}=10$

(iii) $\sin^2 6^\circ+\sin^2 12^\circ+\sin^2 18^\circ\ldots\ldots+\sin^2 84^\circ+\sin^2 90^\circ=8$

Q.4 Prove that $\dfrac{\tan\left(\frac{\pi}{4}+x\right)}{\tan\left(\frac{\pi}{4}-x\right)}=\left(\dfrac{1+\tan x}{1-\tan x}\right)^2$

Q.5 Prove that :

(i) $\cos\left(\frac{3\pi}{2}+x\right)\cos(2\pi+x)\left[\cot\left(\frac{3\pi}{2}-x\right)+\cot(2\pi+x)\right]=1$

(ii) $\sin(n+1)x\ \sin(n+2)x+\cos(n+1)x\ \cos(n+2)x=\cos x$

Q.6 Prove that $\cos^2 2x-\cos^2 6x=\sin 4x\sin 8x$

Q.7 Prove that :

(i) $\dfrac{\sin 5x+\sin 3x}{\cos 5x+\cos 3x}=\tan 4x$, (ii) $\dfrac{\sin x-\sin 3x}{\sin^2 x-\cos^2 x}=2\sin x$, (iii) $\dfrac{\cos 4x+\cos 3x+\cos 2x}{\sin 4x+\sin 3x+\sin 2x}=\cot 3x$

Q.8 Prove that $\sin x+\sin 3x+\sin 5x+\sin 7x=4\cos x\cos 2x\sin 4x$

Q.9 Prove that $\sin 3x+\sin 2x-\sin x=4\sin x\cos\frac{x}{2}\cos\frac{3x}{2}$

Q.10 If $A+B=45^\circ$, show that $(\cot A-1)(\cot B-1)=2$

Q.11 If $\sin\alpha - \sin\beta = \frac{1}{3}$ and $\cos\beta - \cos\alpha = \frac{1}{2}$, show that $\cot\frac{\alpha+\beta}{2} = \frac{2}{3}$

Q.12 Prove that :

(i) $\cos 10^\circ \cos 30^\circ \cos 50^\circ \cos 70^\circ = \frac{3}{16}$ (ii) $\cos 36^\circ \cos 72^\circ \cos 108^\circ \cos 144^\circ = \frac{1}{16}$

Q.13 Prove that $\left(1+\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1+\cos\frac{5\pi}{8}\right)\left(1+\cos\frac{7\pi}{8}\right) = \frac{1}{8}$

Q.14 If $\cos\alpha + \cos\beta = \frac{1}{3}$ and $\sin\alpha + \sin\beta = \frac{1}{4}$, prove that $\cos\frac{\alpha-\beta}{2} = \pm\frac{5}{24}$.

Q.15 If $A + B + C = \frac{\pi}{2}$, show that

(i) $\cot A + \cot B + \cot C = \cot A \cot B \cot C$
(ii) $\tan A \tan B + \tan B \tan C + \tan C \tan A = 1$

SECTION-B [JEE (MAIN)]

Q.1 The value of $\frac{\tan 495^\circ}{\cot 855^\circ}$ equals

(A) 0 (B) $\frac{1}{2}$ (C) 1 (D) $\sqrt{3}$

Q.2 The value of $\cos 18^\circ - \sin 18^\circ$ is equal to

(A) $\sin 27^\circ$ (B) $\sqrt{2}\ \sin 27^\circ$ (C) $2\sin 27^\circ$ (D) $\sqrt{2}\ \sin 63^\circ$

Q.3 The minimum value of $4\sec^2\theta + 9\,\mathrm{cosec}^2\,\theta$, is

(A) 12 (B) 19 (C) 25 (D) 27

Q.4 The value of $\sum_{r=1}^{36} \sin^2 5r^\circ$ equals

(A) 8 (B) 18 (C) 19 (D) $18\frac{1}{2}$

Q.5 The value of $\sin(45045^\circ) + \sin(1125^\circ)$ is equal to

(A) 1 (B) $\sqrt{2}$ (C) $\frac{1}{\sqrt{2}}$ (D) 2

Q.6 If $\sin\theta \cdot \sin\left(\frac{\pi}{3}-\theta\right)\cdot\sin\left(\frac{\pi}{3}+\theta\right) = \frac{1}{8}$, then the number of solution in $(0, 2\pi)$ is

(A) 2 (B) 4 (C) 6 (D) 3

Q.7 If $\frac{\sin^4 x}{2} + \frac{\cos^4 x}{3} = \frac{1}{5}$, then

(A) $\tan^2 x = \frac{1}{3}$ (B) $\frac{\sin^8 x}{8} + \frac{\cos^8 x}{27} = \frac{1}{125}$

(C) $\sin^2 x = \frac{\sqrt{2}}{3}$ (D) $\cos^2 x = \frac{3}{\sqrt{2}}$

Q.8 The value of $\frac{\sin\left(-\frac{11\pi}{3}\right)\tan\left(-\frac{35\pi}{6}\right)\sec\left(-\frac{7\pi}{3}\right)}{\cos\left(\frac{5\pi}{4}\right)\operatorname{cosec}\left(\frac{7\pi}{4}\right)\cos\left(\frac{17\pi}{6}\right)}$ is equal to

(A) $\frac{\sqrt{3}}{2}$ (B) $\frac{-\sqrt{3}}{2}$ (C) $\frac{-2}{\sqrt{3}}$ (D) $\frac{2}{\sqrt{3}}$

Q.9 $A = \cos 360^\circ \cdot \sin^2 270^\circ - 2\cos 180^\circ \cdot \tan 225^\circ$
$B = 3\sin 540^\circ \cdot \sec 720^\circ + 2\operatorname{cosec} 450^\circ - \cos 3600^\circ\cdot$
$C = 2\sec^2 2\pi \cdot \cos 0^C + 3\sin^3 \frac{3\pi}{2} - \operatorname{cosec}\frac{5\pi}{2}$
and $D = \tan\pi \,.\, \cos\frac{3\pi}{2} + \sec 2\pi - \operatorname{cosec}\frac{3\pi}{2}$
then value of $A + B - C \div D$ equals
(A) 3 (B) 5 (C) 2 (D) 1

Q.10 The sum $\sum_{r=1}^{2009}\cos\left(\frac{r\pi}{6}\right)$ equals.

(A) 0 (B) 1 (C) $\frac{\sqrt{3}+1}{2\sqrt{2}}$ (D) $\frac{\sqrt{2}+\sqrt{3}}{2}$

Q.11 The exact value of $\frac{96\sin 80^\circ \sin 65^\circ \sin 35^\circ}{\sin 20^\circ + \sin 50^\circ + \sin 110^\circ}$ is equal to

(A) 12 (B) 24 (C) – 12 (D) 48

Q.12 If the value of the sum $\sum_{r=1}^{3}\left(\frac{\tan 2^{r-1}}{\cos 2^{r}}\right)$ is expressed in the form of $\tan(2^a) - \tan(2^b)$, then the ordered pair (a, b) is equal to

(A) (8, 1) (B) (3, 0) (C) $\left(\frac{\pi}{4}, 3\right)$ (D) $\left(3, \frac{\pi}{4}\right)$

Q.13 Let M and m denotes the maximum and minimum value of ,
$f(\theta) = 9\sin\theta + 16\cos^3\theta - 12\sin^3\theta - 12\cos\theta$, then $|M - m|$ equals.

(A) 5 (B) 0 (C) 10 (D) 15

Q.14 If $\left|5\sin\theta + 3\sin\left(\theta - \frac{\pi}{3}\right)\right| \le a$ for all θ then the value of a equals

(A) 8 (B) 7 (C) 6 (D) 5

Q.15 The value of $\tan 225^\circ \cot 405^\circ + \tan 765^\circ \cot 675^\circ$ is equal to

(A) – 1 (B) 0 (C) $\frac{1}{\sqrt{3}}$ (D) $\sqrt{3}$

Q.16 If $\tan\alpha = \frac{1}{7}$ and $\sin\beta = \frac{1}{\sqrt{10}}$ $\alpha, \beta \in \left(0, \frac{\pi}{2}\right)$ then $\tan(\alpha + 2\beta)$ equals

(A) 1 (B) 3 (C) 5 (D) none

Q.17 If $T_n = (\sin^n\theta + \cos^n\theta)$, then $\frac{T_5 - T_3}{T_7 - T_5}$ is equal to

(A) $\frac{T_2}{T_5}$ (B) $\frac{T_5}{T_3}$ (C) $\frac{T_1}{T_3}$ (D) $\frac{T_3}{T_2}$

Q.18 $\cos 20^\circ \cos 100^\circ + \cos 100^\circ \cos 140^\circ - \cos 140^\circ \cos 200^\circ$ equals

(A) $-\frac{3}{4}$ (B) $\frac{3}{4}$ (C) $\frac{1}{4}$ (D) $-\frac{1}{4}$

Q.19 In a triangle ABC, tanA : tanB : tanC = 1: 2 : 3 then value of 3tanA + 2tanB + tanC =

(A) 10 (B) –10 (C) 3 (D) –3

Q.20 If θ is a root of $16\sin^2\theta - 2\sin\theta - 3 = 0$, where $\theta \in \left(\pi, \frac{3\pi}{2}\right)$ then $\sin(2\theta)$ equals

(A) $\frac{3\sqrt{55}}{32}$ (B) $\frac{3\sqrt{55}}{64}$ (C) $-\frac{3\sqrt{55}}{64}$ (D) $-\frac{3\sqrt{55}}{32}$

Q.21 $\dfrac{\sum_{r=1}^{4}\sin(4r-3)\theta}{\sum_{r=1}^{4}\cos(4r-3)\theta}$ equals

(A) $\cot 7\theta$ (B) $\tan 4\theta$ (C) $\cot 4\theta$ (D) $\tan 7\theta$

Q.22 Which of the following equals to unity,

(A) $\tan\left(\frac{\pi}{8}\right)\cot\left(\frac{3\pi}{8}\right)$ (B) $\sin\frac{\pi}{5}\cos\frac{2\pi}{5}$

(C) $\dfrac{\tan(147^\circ)-\tan(93^\circ)-\tan(54^\circ)}{\tan(147^\circ)\tan(93^\circ)\tan(54^\circ)}$ (D) $\sin\left(\frac{\pi}{12}\right)\cos\left(\frac{\pi}{12}\right)\sin\left(\frac{7\pi}{12}\right)\cos\left(\frac{7\pi}{12}\right)$

Q.23 If $\tan(\pi\cos\theta) = \cot(\pi\sin\theta)$, then $\sin(\theta + \pi/4)$ equals

(A) $\frac{1}{\sqrt{2}}$ (B) $\frac{1}{2}$ (C) $\frac{1}{2\sqrt{2}}$ (D) $\frac{\sqrt{3}}{2}$ **[3010211201]**

Q.24 If $\alpha + \beta = 90^\circ$ the maximum value of $\sin 2\alpha \cdot \sin 2\beta$ is

(A) 1 (B) $\frac{1}{2}$ (C) $\frac{3}{2}$ (D) none **[3010210802]**

Q.25 If $\tan 2x = \frac{3}{4}$ then the value of $4\cos 4x + 3\sin 4x = ?$

(A) 4 (B) 1 (C) 7 (D) 4 **[3010211202]**

Q.26 If $\sin^2\theta = \dfrac{x^2+y^2+1}{2x}$ then $(x+1)^{(y+2)} = ?$

(A) 4 (B) 9 (C) 16 (D) 1 **[3010210948]**

Q.27 If $\tan\alpha$ is equal to the integral solution of the inequality $4x^2 - 16x + 15 < 0$ and $\cos\beta$ is equal to the slope of the bisector of the first quadrant, then $5\cos(\alpha+\beta)\cos(\alpha-\beta) = ?$

(A) 5 (B) 2 (C) 1 (D) 0 **[3010211150]**

Q.28 In a ΔABC, $\tan A + \tan B + \tan C = 6$ and $\tan A \tan B = 2$ then the value of $\sum \tan A \tan B = ?$

(A) 12 (B) 10 (C) 9 (D) 10 [**3010210149]**

Q.29 If $\sin\theta_1\sin\theta_2 - \cos\theta_1\cos\theta_2 - 1 = 0$ where $\theta_1 + \theta_2 \in (0, 2\pi)$ then value of $\left(1+\tan\frac{\theta_1}{4}\right)\left(1+\tan\frac{\theta_2}{4}\right) =$

(A) 2 (B) 3 (C) 4 (D) 1 **[3010210945]**

Q.30 If $a + b = 3 - \cos 4\theta$ and $a - b = 4\sin 2\theta$ then ab is always less than or equal to

(A) $\frac{1}{2}$ (B) 1 (C) $\frac{2}{3}$ (D) 3 **[3010210902]**

EXERCISE-2

[JEE ADVANCED]

[SINGLE CORRECT CHOICE TYPE]

Q.1 Let $f(\theta) = \sin\theta\,(\sin\theta + \sin 3\theta)$. Then $f(\theta)$:

(A) ≥ 0 only when $\theta \geq 0$ (B) ≤ 0 for all real θ

(C) ≥ 0 for all real θ (D) ≤ 0 only when $\theta \leq 0$. **[3010211049]**

Q.2 For a positive integer n, let $f_n(\theta) = \left(\tan\frac{\theta}{2}\right)(1+\sec\theta)(1+\sec 2\theta)(1+\sec 4\theta)\ldots.(1+\sec 2^n\theta)$ Then

(A) $f_2\left(\frac{\pi}{16}\right) = 1$ (B) $f_3\left(\frac{\pi}{32}\right) = 1$ (C) $f_4\left(\frac{\pi}{64}\right) = 1$ (D) $f_5\left(\frac{\pi}{128}\right) = 1$

[3010210899]

Q.3 Let $A_0A_1A_2A_3A_4A_5$ be a regular hexagon inscribed in a circle of unit radius .
Then the product of the lengths of the line segments A_0A_1, A_0A_2 & A_0A_4 is

(A) $\frac{3}{4}$ (B) $3\sqrt{3}$ (C) 3 (D) $\frac{3\sqrt{3}}{2}$

[3010210101]

Q.4 Which of the following number(s) is/are rational ?

(A) $\sin 15^\circ$ (B) $\cos 15^\circ$ (C) $\sin 15^\circ \cos 15^\circ$ (D) $\sin 15^\circ \cos 75^\circ$

[3010210400]

Q.5 $\sec^2\theta = \frac{4xy}{(x+y)^2}$ is true if and only if

(A) $x+y \neq 0$ (B) $x = y,\ x \neq 0$ (C) $x = y$ (D) $x \neq 0,\ y \neq 0$

[3010210525]

Q.6 Let n be an odd integer. If $\sin n\theta = \sum_{r=0}^{n} b_r \sin^r\theta$, for every value of θ, then

(A) $b_0 = 1, b_1 = 3$ (B) $b_0 = 0, b_1 = n$ (C) $b_0 = -1, b_1 = n$ (D) $b_0 = 0, b_1 = n^2 - 3n + 3$

[3010210700]

[PARAGRAPH TYPE]

Paragraph for Question nos. 7 to 9

Let $y = \dfrac{\cos x + \cos 2x + \cos 3x + \cos 4x + \cos 5x + \cos 6x + \cos 7x}{\sin x + \sin 2x + \sin 3x + \sin 4x + \sin 5x + \sin 6x + \sin 7x}$ **[3010210946]**

Q.7 The value of y when $x = \pi/8$ is

(A) 1 (B) 0 (C) $\sqrt{2}-1$ (D) not defined

Q.8 The value of y when $x = \pi/16$ is

(A) 1 (B) 0 (C) $\sqrt{2}-1$ (D) $\sqrt{2}+1$

Q.9 The value of y when $x = \pi/32$ is

(A) 1 (B) 0 (C) $\sqrt{2}-1$ (D) $\sqrt{2}+1$

Paragraph for question no. 10 & 11

Let $f(x) = 25\sin^2 x - 60\sin x + 84$ **[3010211101]**

Q.10 Minimum value of f(x) is
(A) 48 (B) 49 (C) 50 (D) 51

Q.11 Maximum value of f(x) is
(A) 160 (B) 168 (C) 169 (D) does not exist

[REASONING TYPE]

Q.12 **Statement 1:** $\cos 1 < \cos 7$
Statement 2: $1 < 7$
(A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.
(B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.
(C) Statement-1 is true, statement-2 is false.
(D) Statement-1 is false, statement-2 is true. **[3010210701]**

Q.13 **Statement 1:** If $f(\theta) = (\sin\theta + \operatorname{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2$ then the minimum value of $f(\theta)$ is 9.
Statement 2 : Maximum value of $\sin 2\theta$ is 1.
(A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.
(B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.
(C) Statement-1 is true, statement-2 is false.
(D) Statement-1 is false, statement-2 is true. **[3010210751]**

Q.14 **Statement-1:** $\tan\frac{6\pi}{7} - \tan\frac{5\pi}{7} - \tan\frac{\pi}{7} = \tan\frac{6\pi}{7}\cdot\tan\frac{5\pi}{7}\cdot\tan\frac{\pi}{7}$

Statement-2: If $\theta = \alpha + \beta$, then $\tan\theta - \tan\alpha - \tan\beta = \tan\theta\cdot\tan\alpha\cdot\tan\beta$.
(A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.
(B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.
(C) Statement-1 is true, statement-2 is false.
(D) Statement-1 is false, statement-2 is true. **[3010210849]**

[MULTIPLE CORRECT CHOICE TYPE]

Q.15 If A & B are acute angles such the A + B and A – B satisfy the equation $\tan^2\theta - 4\tan\theta + 1 = 0$ then
(A) $A = \pi/4$ (B) $A = \pi/6$ (C) $B = \pi/4$ (D) $B = \pi/6$
[3010211351]

Q.16 If $\tan 1^\circ\cdot\tan 2^\circ\cdot\tan 3^\circ \ldots\ldots \tan 89^\circ = 4x^2 + 2x$ then find the value of x.

(A) $x = \sin\frac{\pi}{5}$ (B) $\cos\frac{\pi}{5}$ (C) $\sin\frac{\pi}{10}$ (D) $\cos\frac{4\pi}{5}$

[3010211750]

Q.17 $\frac{\sin^3 x}{1+\cos x} + \frac{\cos^3 x}{1-\sin x} =$

(A) $\sqrt{2}\cos\left(\frac{\pi}{4} - x\right)$ (B) $\sqrt{2}\cos\left(\frac{\pi}{4} + x\right)$ (C) $\sqrt{2}\sin\left(\frac{\pi}{4} - x\right)$ (D) $\sqrt{2}\sin\left(\frac{\pi}{4} + x\right)$

[3010211111]

Q.18 Which of the following is a subset of range of function $\log_2\left[\cos\left(\frac{\pi}{4}\sin^2 x\right)\right]$

(A) $\left[-\frac{1}{2}, 0\right]$ (B) $\left[-\frac{1}{4}, \frac{1}{4}\right]$ (C) $\left[-\frac{1}{4}, -\frac{1}{8}\right]$ (D) $\left[-\frac{1}{8}, -\frac{1}{16}\right]$

[3010211401]

Q.19 If $\frac{\sin^4 x}{2} + \frac{\cos^4 x}{3} = \frac{1}{5}$ then

(A) $\sin^2 x = \frac{2}{5}$ (B) $\cos^2 x = \frac{3}{5}$

(C) $\frac{\sin^6 x}{4} + \frac{\cos^6 x}{4} = 1$ (D) None **[3010211149]**

Q.20 If $\cos(A-B) = \frac{4}{5}$ and $\tan A \tan B = 2$ then

(A) $\cos A \cdot \cos B = \frac{1}{5}$ (B) $\sin A \cdot \sin B = -\frac{2}{5}$ (C) $\cos(A+B) = -\frac{1}{5}$ (D) $\sin(A+B) = \frac{3}{\sqrt{5}}$

[3010211399]

Q.21 Which of the following quantities are rational

(A) $\sin\left(\frac{11\pi}{12}\right)\sin\left(\frac{5\pi}{12}\right)$ (B) $\operatorname{cosec}\left(\frac{9\pi}{10}\right)\sec\left(\frac{4\pi}{5}\right)$

(C) $\sin^4\left(\frac{\pi}{8}\right) + \cos^4\left(\frac{\pi}{8}\right)$ (D) $\left(1+\cos\frac{2\pi}{9}\right)\left(1+\cos\frac{4\pi}{9}\right)\left(1+\cos\frac{8\pi}{9}\right)$

[3010211650]

Q.22 The expression $(\tan^4 x + 2\tan^2 x + 1) \times \frac{1}{1+\tan^2 x}$ when $x = \frac{\pi}{12}$ can be equal to

(A) $4(2-\sqrt{3})$ (B) $4(\sqrt{2}+1)$ (C) $16\cos^2\frac{\pi}{12}$ (D) $16\sin^2\frac{\pi}{12}$

[3010211601]

Q.23 If $\cot\theta + \tan\theta = x$ and $\sec\theta - \cos\theta = y$, then

(A) $\sin\theta\cos\theta = 1/2$ (B) $\sin\theta\tan\theta = y$

(C) $(x^2y)^{2/3} - (xy^2)^{2/3} = 1$ (D) $(x^2y)^{1/3} + (xy^2)^{1/3} = 1$ **[3010211950]**

Q.24 In a triangle ABC, $\tan\frac{A}{2}, \tan\frac{B}{2}, \tan\frac{C}{2}$ are in H.P, then $\cot\frac{A}{2}\cot\frac{C}{2}$ has the value

(A) 1 (B) 2 (C) 3 (D) $\frac{5}{2}$

[3010211647]

[MATRIX TYPE]

Q.25

	Column-I	Column-II	
(A)	The minimum value of expression $\sec^2\theta + \operatorname{cosec}^2\theta$ is equal to	(P)	0
(B)	If $\cos 17° \sin 4° - \cos 19° \sin 6° + \cos 23° \sin 2° = k \sin 15°$, then k equals	(Q)	1
(C)	If $y = \cos^2(45° + x) + (\sin x - \cos x)^2$ then the maximum value of y is	(R)	2
(D)	If $\tan 50° - \tan 40° = k \tan 10°$ then the value of k is	(S)	3
		(T)	4

[3010211551]

Q.26

	Column-I	Column-II	
(A)	The expresion wherever defined simplifies to $\dfrac{\cos^3\left(\frac{\pi}{2}+x\right)\cot(3\pi+x)\sec(x-3\pi)\operatorname{cosec}\left(\frac{3\pi}{2}-x\right)}{\tan^2(x-\pi)\sin(x-2\pi)}$	(P)	1
		(Q)	$\tan x$
(B)	The expression wherever defined simplifies to $\dfrac{\sin(270°+x)\cos^3(720°-x)-\sin(270°-x)\sin^3(540°+x)}{\sin(90°+x)\sin(-x)-\cos^2(180°-x))} + \dfrac{\cot(270°-x)}{\operatorname{cosec}^2(450°+x)}$	(R)	$-\cot x$
		(S)	$\sec x + \tan x$
(C)	The expression, $\dfrac{\sin x - \cos x + 1}{\sin x + \cos x - 1}$ simplifies to (wherever it is defined)		

[3010211700]

[INTEGER TYPE]

Q.27 Let $A_1, A_2, \ldots\ldots, A_n$ be the vertices of an n-sided regular polygon such that ; $\dfrac{1}{A_1A_2} = \dfrac{1}{A_1A_3} + \dfrac{1}{A_1A_4}$. Find the value of n.

[3010210551]

Q.28 Find the sum of all values of θ in the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ satisfying the equation; $(1 - \tan\theta)(1 + \tan\theta)\sec^2\theta + 2^{\tan^2\theta} = 0$.

[3010210286]

Q.29 In a triangle ABC (where A, B, C are acute angles), the minimum value of $\tan A + \tan B + \tan C = \sqrt{k}$ where $k \in N$, then find the value of k.

[3010210999]

Q.30 Find the product of the maximum and minimum values of $27^{\cos 2x} \cdot 81^{\sin 2x}$. **[3010211050]**

Q.31 If the sum of the smallest positive values of x and y satisfying, $x - y = \frac{\pi}{4}$, $\cot x + \cot y = 2$ is equal to $\frac{p\pi}{q}$ (where p and q are coprime numbers), then find the value of $(p + q)$

[3010210851]

Q.32 Let $f(\theta) = \frac{1}{1+(\cot\theta)^x}$ then $S = \sum_{\theta=1^\circ}^{89^\circ} f(\theta)$, find [S].

[**Note :** [S] denotes the largest integer less than or equal to S.] **[3010210001]**

Q.33 If $\frac{1}{\sin 20^\circ} - \frac{1}{\sqrt{3}\cos 20^\circ} = k$, then find the value of $18k^4 + 162k^2 + 369$. **[3010210350]**

Q.34 $\frac{\cos 5A}{\cos A} + \frac{\sin 5A}{\sin A} = a + b\cos 4A$, then find the value of $(a + b)$. **[3010211151]**

Q.35 If L denotes the least value of the expression $y = 9\sec^2\alpha + 16\,\text{cosec}^2\alpha$ and M denotes the maximum value of the expression $\gamma = \sin^2\alpha + 8\cos\alpha - 7$, find the value of $(L + M)$.

[3010211400]

Q.36 Find the sum $\sum_{k=1}^{51}\cos^2\frac{k\pi}{52}$. **[3010210326]**

Q.37 Let α, β, γ be acute angles such that $\alpha + \beta + \gamma = \frac{\pi}{2}$. If β, α, γ (in order) are in arithmetic progression and satisfying $\frac{\sin(\alpha-\beta)}{\cos(\alpha+\beta)} = \frac{\sqrt{3}-1}{2}$, then the value of $(6\alpha + 12\beta + 4\gamma)$ equals $k\pi$ when $k \in N$, find k.

[3010210201]

Q.38 If the value of $\sin 24^\circ = \frac{\sqrt{a}+\sqrt{b}-\sqrt{c-\sqrt{d}}}{8}$, where a, b, c, $d \in N$ then find $(a + b + c + d)$.

[3010211550]

Q.39 Let U denotes the value of

$$4\cos\frac{\pi}{5} - 4\cos\frac{2\pi}{5} + 4\sin\frac{\pi}{10}\cos\frac{\pi}{5} \quad \text{and}$$

V denotes the number of values of $\theta \in [-2\pi, 2\pi]$ satisfying the equation $\text{cosec}\,\theta = 1 + \cot\theta$, then find $(U + V)$.

[3010211240]

Q.40 For $x \in [0, \pi] - \left\{\frac{\pi}{2}\right\}$ and $y \in [\pi, 2\pi] - \left\{\frac{3\pi}{2}\right\}$,

if $\tan^2 y \tan x + \tan^2 y + 4\tan x \tan y + 4\tan y + \tan x + 1 = 0$,

then the maximum value of $x + y = \frac{m\pi}{n}$, where m, n are co-prime. Find $(m + n)$.

[3010212700]

EXERCISE-3

[JEE(MAIN) PREVIOUS YEAR]

Q.1 In a ΔPQR, if $3\sin P + 4\cos Q = 6$ and $4\sin Q + 3\cos P = 1$, then the angle R is equal to

(A) $\frac{\pi}{4}$ (B) $\frac{3\pi}{4}$ (C) $\frac{5\pi}{6}$ (D) $\frac{\pi}{6}$ [AIEEE - 2012]

[3010212525]

Q.2 ABCD is a trapezium such that AB and CD are parallel and $BC \perp CD$. If $\angle ADB = \theta$, BC = p and CD = q, then AB is equal to

(A) $\frac{p^2 + q^2\cos\theta}{p\cos\theta + q\sin\theta}$ (B) $\frac{p^2 + q^2}{p^2\cos\theta + q^2\sin\theta}$ **[3010212569]**

(C) $\frac{(p^2 + q^2)\sin\theta}{(p\cos\theta + q\sin\theta)^2}$ (D) $\frac{(p^2 + q^2)\sin\theta}{p\cos\theta + q\sin\theta}$ [JEE-Main 2013]

Q.3 The expression $\frac{\tan A}{1-\cot A} + \frac{\cot A}{1-\tan A}$ can be written as

(A) sec A cosec A + 1 (B) tan A + cot A

(C) sec A + cosec A (D) sin A cos A + 1 **[3010212721]**

[JEE-Main 2013]

Q.4 Let $f_k(x) = \frac{1}{k}(\sin^k x + \cos^k x)$ where $x \in R$ and $k \geq 1$. Then $f_4(x) - f_6(x)$ equals

(A) $\frac{1}{12}$ (B) $\frac{1}{6}$ (C) $\frac{1}{3}$ (D) $\frac{1}{4}$ [JEE Main 2014]

Q.5 If $5(\tan^2 x - \cos^2 x) = 2\cos 2x + 9$, then the value of cos 4x is

(A) $\frac{-3}{5}$ (B) $\frac{1}{3}$ (C) $\frac{2}{9}$ (D) $\frac{-7}{9}$

[JEE (Main) 2017]

EXERCISE-4

[JEE(ADVANCED) PREVIOUS YEAR]

Q.1 If $\alpha + \beta = \frac{\pi}{2}$ and $\beta + \gamma = \alpha$ then $\tan\alpha$ equals [JEE 2001]

(A) $2(\tan\beta + \tan\gamma)$ (B) $\tan\beta + \tan\gamma$ (C) $\tan\beta + 2\tan\gamma$ (D) $2\tan\beta + \tan\gamma$

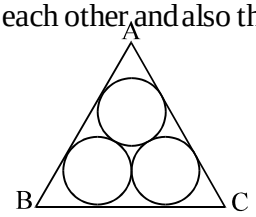
[3010210451]

Q.2 If θ and ϕ are acute angles satisfying $\sin\theta = \frac{1}{2}$, $\cos\phi = \frac{1}{3}$, then $\theta + \phi \in$ [JEE 2004 (Screening)]

(A) $\left(\frac{\pi}{3}, \frac{\pi}{2}\right]$ (B) $\left(\frac{\pi}{2}, \frac{2\pi}{3}\right)$ (C) $\left(\frac{2\pi}{3}, \frac{5\pi}{6}\right)$ (D) $\left(\frac{5\pi}{6}, \pi\right)$

[3010210051]

Q.3 In an equilateral triangle, 3 coins of radii 1 unit each are kept so that they touch each other and also the sides of the triangle. Area of the triangle is



(A) $4 + 2\sqrt{3}$ (B) $6 + 4\sqrt{3}$

(C) $12 + \frac{7\sqrt{3}}{4}$ (D) $3 + \frac{7\sqrt{3}}{4}$

[JEE 2005 (Screening)] **[3010210300]**

Q.4 The number of ordered pairs (α, β), where $\alpha, \beta \in (-\pi, \pi)$ satisfying $\cos(\alpha - \beta) = 1$

and $\cos(\alpha + \beta) = \frac{1}{e}$ is [JEE 2005 (Screening)]

(A) 0 (B) 1 (C) 2 (D) 4

[3010211251]

Q.5 Let $\theta \in (0, \pi/4)$ and $t_1 = (\tan\theta)^{\tan\theta}$, $t_2 = (\tan\theta)^{\cot\theta}$, $t_3 = (\cot\theta)^{\tan\theta}$, $t_4 = (\cot\theta)^{\cot\theta}$, then

(A) $t_1 > t_2 > t_3 > t_4$ (B) $t_4 > t_3 > t_1 > t_2$ (C) $t_3 > t_1 > t_2 > t_4$ (D) $t_2 > t_3 > t_1 > t_4$

[JEE 2006, 3]

[3010210599]

Q.6 If $\frac{\sin^4 x}{2} + \frac{\cos^4 x}{3} = \frac{1}{5}$, then [JEE 2009]

(A) $\tan^2 x = \frac{2}{3}$ (B) $\frac{\sin^8 x}{8} + \frac{\cos^8 x}{27} = \frac{1}{125}$

(C) $\tan^2 x = \frac{1}{3}$ (D) $\frac{\sin^8 x}{8} + \frac{\cos^8 x}{27} = \frac{2}{125}$ **[3010210949]**

Q.7 For $0 < \theta < \frac{\pi}{2}$, the solution(s) of $\sum_{m=1}^{6} \operatorname{cosec}\left(\theta + \frac{(m-1)\pi}{4}\right)\operatorname{cosec}\left(\theta + \frac{m\pi}{4}\right) = 4\sqrt{2}$ is (are)

[JEE 2009]

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{12}$ (D) $\frac{5\pi}{12}$

[3010210100]

Q.8 The maximum value of the expression $\frac{1}{\sin^2\theta + 3\sin\theta\cos\theta + 5\cos^2\theta}$ is [JEE 2010]

[3010210402]

Q.9 Two parallel chords of a circle of radius 2 are at a distance $\sqrt{3} + 1$ apart. If the chords subtend at the center, angles of $\frac{\pi}{k}$ and $\frac{2\pi}{k}$ where $k > 0$, then the value of [k] is

[**Note :** [k] denotes the largest integer less than or equal to k] [JEE 2010]

[3010210552]

Q.10 Let $P = \{\theta : \sin\theta - \cos\theta = \sqrt{2}\cos\theta\}$ and $Q = \{\theta : \sin\theta + \cos\theta = \sqrt{2}\sin\theta\}$ be two sets. Then

(A) $P \subset Q$ and $Q - P \neq \phi$ (B) $Q \not\subset P$

(C) $P \not\subset Q$ (D) $P = Q$ [JEE 2011]

[3010210801]

Q.11 The positive integer value of $n > 3$ satisfying the equation $\frac{1}{\sin\frac{\pi}{n}} = \frac{1}{\sin\frac{2\pi}{n}} + \frac{1}{\sin\frac{3\pi}{n}}$, is

[JEE 2011]

[3010210050]

Q.12 The value of $\sum_{k=1}^{13} \frac{1}{\sin\left(\frac{\pi}{4} + \frac{(k-1)\pi}{6}\right)\sin\left(\frac{\pi}{4} + \frac{k\pi}{6}\right)}$ is equal to

(A) $3 - \sqrt{3}$ (B) $2(3 - \sqrt{3})$ (C) $2(\sqrt{3} - 1)$ (D) $2(2 + \sqrt{3})$

[JEE (Advanced) 2016, 3]

Q.13 Let α and β be non-zero real numbers such that $2(\cos\beta - \cos\alpha) + \cos\alpha\cos\beta = 1$. Then which of the following is/are true?

(A) $\sqrt{3}\tan\left(\frac{\alpha}{2}\right) + \tan\left(\frac{\beta}{2}\right) = 0$ (B) $\sqrt{3}\tan\left(\frac{\alpha}{2}\right) - \tan\left(\frac{\beta}{2}\right) = 0$

(C) $\tan\left(\frac{\alpha}{2}\right) + \sqrt{3}\tan\left(\frac{\beta}{2}\right) = 0$ (D) $\tan\left(\frac{\alpha}{2}\right) - \sqrt{3}\tan\left(\frac{\beta}{2}\right) = 0$

[JEE (Advanced) 2017, 3]

EXERCISE-5

[RANK BOOSTER]

[SINGLE CORRECT CHOICE TYPE]

Q.1 $\frac{\sin x}{a}=\frac{\cos x}{b}=\frac{\tan x}{c}=2$ when $\left(0<x<\frac{\pi}{2}\right)$ then $R=bc+\frac{1}{2c}+\frac{2a}{1+2b}$ then minimum value of R is

(A) 1 (B) 2 (C) –1 (D) 4

[3010210099]

Q.2 $\frac{\sin x}{\sin y}=\frac{1}{2}, \frac{\cos x}{\cos y}=\frac{3}{2}$, when $x, y \in \left(\theta, \frac{\pi}{2}\right)$ then find the value of $\tan(x+y)$ is = ?

(A) $\sqrt{13}$ (B) $\sqrt{14}$ (C) $\sqrt{17}$ (D) $\sqrt{15}$

[3010211346]

Q.3 If $\frac{4\cos\frac{\pi}{15}\cdot\cos\frac{4\pi}{15}\cdot\cos\frac{2\pi}{5}}{\left(4\cos^2\frac{\pi}{10}-1\right)}=\sin\theta$, where $\theta \in \left(\frac{\pi}{2}, \pi\right)$, then θ equals

(A) $\frac{4\pi}{5}$ (B) $\frac{9\pi}{10}$ (C) $\frac{13\pi}{15}$ (D) $\frac{11\pi}{15}$

Q.4 If $\sin 2x=\frac{1023}{1024}$, where $x \in \left(\frac{\pi}{4}, \frac{\pi}{2}\right)$, then the value of $(\sin x-\cos x)$ equals

(A) $\frac{1}{32}$ (B) $\frac{-1}{32}$ (C) $\frac{1}{12}$ (D) $\frac{-1}{12}$

[PARAGRAPH TYPE]

Paragraph for question nos. 5 & 6

Consider, $f_r(\theta)=\frac{\cos 2r\theta+\cos 6\theta}{2}$ and $g_n(\theta)=\sum_{r=1}^{n}\frac{1}{f_r(\theta)}$.

Q.5 If $\sum_{r=1}^{10} f_r\left(\frac{\pi}{21}\right)=p\cos\left(\frac{2\pi}{7}\right)-\frac{1}{q}$, $p, q \in N$, then $(p+q)$ is equal to

(A) 12 (B) 9 (C) 7 (D) 5

Q.6 The value of $g_7(12°)$ is equal to

(A) $3-\sqrt{5}$ (B) $\sqrt{5}-3$ (C) $\frac{4}{\sqrt{5}-1}$ (D) $\frac{4}{\sqrt{5}+1}$

Paragraph for question nos. 7 & 8

Let $A = \cos\frac{\pi}{2n+1} + \cos\frac{3\pi}{2n+1} + \cos\frac{5\pi}{2n+1} + \ldots\ldots + n$ terms.

Let $f(\theta) = \frac{\cot\theta}{1+\cot\theta}$ and $\alpha + \beta = \frac{5\pi}{4}$, then $B = f(\alpha) \cdot f(\beta)$.

Q.7 The value of $A + B$ is
(A) 0 (B) 1 (C) 2 (D) 3

Q.8 Then number of digit in A^{-100} is D and number of cyper in B^{10} is C, then $C + D$ is
(A) 31 (B) 32 (C) 33 (D) 34

Paragraph for question nos. 9 to 11

Let $a = \cos 10°$, $b = \cos 50°$ and $c = \cos 70°$.

Q.9 The value of $(a^2 + b^2 + c^2)$ is equal to
(A) 2 (B) $\frac{3}{2}$ (C) $\frac{4}{3}$ (D) 1

Q.10 The value of $(b + c)$ is equal to
(A) a (B) $\frac{a}{2}$ (C) 2a (D) $\frac{2a}{3}$

Q.11 The value of $4(a^2 - bc)$ is equal to
(A) $\frac{8}{3}$ (B) $\frac{5}{2}$ (C) 2 (D) 3

[MULTIPLE CORRECT CHOICE TYPE]

Q.12 If $4\sin\alpha\cos\beta + 2\cos\beta - \sqrt{3} = 2\sqrt{3}\sin\alpha$, where $\alpha, \beta \in [0, 2\pi]$ and $L = \alpha - \beta$, then
(A) maximum value of L is $\frac{11\pi}{6}$. (B) minimum value of L is $\frac{-5\pi}{6}$.
(C) maximum value of L is $\frac{5\pi}{3}$. (D) minimum value of L is $\frac{-11\pi}{6}$.

Q.13 If $x_0, y_0 \in [0, \pi]$ which satisfy the equation $\sec\left(\frac{x+y}{2}\right) = 2\sin\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$ then
(A) number of ordered pair (x_0, y_0) is 1. (B) number of ordered pair (x_0, y_0) is 2.
(C) $\tan\left(\frac{x_0+y_0}{4}\right) = 1$. (D) $\cos\left(\frac{x_0+3y_0}{2}\right) = 0$

Q.14 Which of the following is(are) negative?

(A) $\sin(-417°) + \cos(417°)$ (B) $\cot 1 - \tan 1$

(C) $2^x + 2^{-x} - \log_5 24,\ x \in R$ (D) $-3 + \log_{\frac{1}{\pi}}(|\sin x| + 1)$

Q.15 In acute angle triangle ABC, if $1 - \cos(A+B)\cos(A-B) = \cos(A-B) - \cos(A+B)$ and $3\sin C - 4\sin^3 C - 1 = 0$, then

(A) $\tan A + \cot B = 4$. (B) $\sin 2A + \sin C = 1$.

(C) $A + B = 150°$. (D) $\cos A + \cos C = \dfrac{\sqrt{3}+1+\sqrt{6}}{2\sqrt{2}}$.

[MATRIX TYPE]

Q.16

	Column-I	Column-II	
(A)	If the expression $\cos\left(x - \frac{3\pi}{2}\right) + \sin\left(\frac{3\pi}{2} + x\right) + \sin(32\pi + x) - 18\cos(19\pi - x) + \cos(56\pi + x) - 9\sin(x + 17\pi)$ is expressed in the form of $a\sin x + b\cos x$, then the value of b/a equals	(P)	$-1/3$
		(Q)	-2
		(R)	$1/3$
(B)	If $\cos\theta_1 = 2\cos\theta_2$, then $\tan\frac{\theta_1-\theta_2}{2}\cdot\tan\frac{\theta_1+\theta_2}{2}$ is equal to	(S)	2
(C)	If $(\sin x + \cos x)^2 + k\sin x\cos x = 1$ holds $\forall\ x \in R$ then the value of k equals		
(D)	If $\cos\theta = \frac{4}{5}$ then the value of $\tan\frac{\theta}{2}$, can be equal to		

Q.17

	Column-I	Column-II	
(A)	If $A = \sin\frac{2\pi}{7} + \sin\frac{4\pi}{7} + \sin\frac{8\pi}{7}$ and	(P)	1
	$B = \cos\frac{2\pi}{7} + \cos\frac{4\pi}{7} + \cos\frac{8\pi}{7}$, then $\sqrt{A^2+B^2}$ is equal to	(Q)	$\sqrt{2}$
(B)	$\frac{\cos 20° + 8\sin 70°\sin 50°\sin 10°}{\sin^2 80°}$ is equal to	(R)	2
(C)	If $\cos\alpha = \frac{2\cos\beta - 1}{2 - \cos\beta}$ then $\tan^2\frac{\alpha}{2}\cdot\cot^2\frac{\beta}{2}$ has the value equal to {where $\alpha, \beta \in (0, \pi)$}	(S)	$\sqrt{3}$
(D)	Exact value of $\cos 20° + 2\sin^2 55° - \sqrt{2}\sin 65°$ is	(T)	3

[INTEGER TYPE]

Q.18 If $\frac{\left|\sin^3\theta+\sin^3(120°+\theta)+\sin^3(240°+\theta)\right|}{\sin 3\theta} = \frac{p}{q}$ when p and q are in their lowest form, then find (p + q). **[3010210450]**

Q.19 Find the value of $\prod_{r=1}^{11}\sec\left(\frac{r\pi}{11}\right)$ **[3010210351]**

Q.20 If $S = \sum_{k=1}^{\infty}\frac{1}{2^{k+1}}\cdot\tan\frac{\pi}{2^{k+1}}$ then find the absolute value of $\log_{\pi}(S)$. **[3010210951]**

Q.21 Let $f_n(\theta) = \frac{\sin 2\theta}{\sin\left(2^{n+2}\theta\right)}\sin\left(\frac{\pi}{4}+\theta\right)\cdot\sin\left(\frac{\pi}{4}+2\theta\right)\cdot\sin\left(\frac{\pi}{4}+2^2\theta\right).....$

$$\sin\left(\frac{\pi}{4}+2^n\theta\right)\cdot\sin\left(\frac{\pi}{4}-\theta\right)\cdot\sin\left(\frac{\pi}{4}-2\theta\right).....\sin\left(\frac{\pi}{4}-2^n\theta\right),$$

then find $\frac{f_4\left(\frac{\pi}{8}\right)}{f_6\left(\frac{\pi}{8}\right)} = ?$ **[3010210850]**

Q.22 If A, B, C are the angles of a triangle then find the minimum value of

$$\frac{\cos\left(\frac{B-C}{2}\right)}{\cos\left(\frac{B+C}{2}\right)}+\frac{\cos\left(\frac{C-A}{2}\right)}{\cos\left(\frac{C+A}{2}\right)}+\frac{\cos\left(\frac{A-B}{2}\right)}{\cos\left(\frac{A+B}{2}\right)}.$$ **[3010210500]**

Q.23 For $\alpha, \beta, \gamma \in \left(0, \frac{3\pi}{2}\right)$ if $\sin^2\alpha = \frac{1}{2}$, $\cos^2\beta = \frac{3}{4}$ and $\tan\gamma = 1$ then the maximum value of $(\alpha - \beta + \gamma)$ equals $\frac{a\pi}{b}$ when a and b are relatively prime. Find (a + b). **[3010210890]**

Q.24 For $A \in \left(0, \frac{}{16}\right)$, let $\prod_{r=1}^{4}\operatorname{cosec}(2^r A) = \operatorname{cosec} A$, then $A = \frac{m}{n}$ where m and n are co-prime. Find (m + n). **[3010211500]**

Q.25 For $\theta \in (0, 2\pi)$. Let $\sum_{n=1}^{5} \frac{\cos(2n\theta)}{\sin(2n-1)\theta \cdot \sin(2n+1)\theta} = \frac{\text{cosec}^2\theta}{\sin(11\theta)}$, find the value of $(\cos^2\theta + \cot^2\theta)$.

[3010212246]

Q.26 If $\cos 2x - \cos x = \sin 4x - \sin x$ (where $\tan x \neq 1$) then find the value of $(\cos 3x - \sin 3x)$.

[3010211051]

[SUBJECTIVE TYPE]

Q.27 Let L denotes the value of $\left(\frac{\tan 20° + \tan 72° + \tan 88°}{\tan 20° \cdot \tan 72° \cdot \tan 88°}\right)$ and M denotes the value of $8\sqrt{2}\sin 5° \cdot \sin 55° \cdot \sin 65°$, then find $\log_3 (L + M)$. **[3010210901]**

Q.28 If $\alpha + \beta + \gamma = \frac{\pi}{2}$, then prove that $\cot\alpha = \frac{\tan\beta + \tan\gamma}{1 - \tan\beta\tan\gamma}$. **[3010210301]**

Q.29 Find the value of a for which the equation $\sin^4 x + \cos^4 x = a$ has real solutions. **[3010210255]**

Q.30 ABC is a triangle such that $\sin(2A + B) = \sin(C - A) = -\sin(B + 2C) = \frac{1}{2}$. If A, B and C are in A.P., determine the values of A, B and C. **[3010210601]**

Q.31 If $0 < x < \frac{\pi}{2}$, prove that $\sqrt{\tan x + \sin x} + \sqrt{\tan x - \sin x} = 2\sqrt{\tan x} \cdot \cos\left(\frac{\pi}{4} - \frac{x}{2}\right)$.

[3010211250]

Q.32 Let $0 < A, B < \frac{\pi}{2}$ satisfying the equalities $3\sin^2 A + 2\sin^2 B = 1$ and $3\sin 2A - 2\sin 2B = 0$, then prove that $A + 2B = \frac{\pi}{2}$. **[3010210150]**

Q.33 If $a\sin^2\theta + b\cos^2\theta = m$, $b\sin^2\phi + a\cos^2\phi = n$ and $a\tan\theta = b\tan\phi$, then show that $\frac{1}{n} + \frac{1}{m} = \frac{1}{a} + \frac{1}{b}$.

[3010210809]

Q.34 Prove that $\sum_{r=1}^{100} \frac{\sin 3^{r-1}\theta}{\cos 3^{r}\theta} = \frac{1}{2}\,[\tan 3^{100}\theta - \tan\theta]$. **[3010211350]**

Q.35 Let $\prod_{n\ 0}^{n} \cos^{2^n} \quad \sin^{2^n} \quad = \frac{\cos^{2^{n\ 1}} \quad \sin^{2^{n\ 1}}}{A(\ )}$, then find $A\left(\theta = \frac{\pi}{6}\right)$. **[3010211100]**

Q.36 If $\frac{9x}{\cos\theta} + \frac{5y}{\sin\theta} = 56$ and $\frac{9x\sin\theta}{\cos^2\theta} - \frac{5y\cos\theta}{\sin^2\theta} = 0$, then find the value of $\left[(9x)^{\frac{2}{3}} + (5y)^{\frac{2}{3}}\right]^3$.

[3010212000]

ANSWER KEY

EXERCISE-1

SECTION-A

Q.1 5 : 4

SECTION-B

Q.1	C	Q.2	B	Q.3	C	Q.4	B	Q.5	B	Q.6	C	Q.7	B
Q.8	C	Q.9	B	Q.10	A	Q.11	B	Q.12	B	Q.13	C	Q.14	B
Q.15	B	Q.16	A	Q.17	C	Q.18	A	Q.19	A	Q.20	A	Q.21	D
Q.22	C	Q.23	C	Q.24	A	Q.25	D	Q.26	A	Q.27	C	Q.28	D
Q.29	A	Q.30	B										

EXERCISE-2

Q.1	C	Q.2	C	Q.3	C	Q.4	B	Q.5	B	Q.6	B	Q.7	A
Q.8	D	Q.9	B	Q.10	C	Q.11	B	Q.12	A	Q.13	A		
Q.14	ABCD			Q.15	A	Q.16	CD	Q.17	AD	Q.18	ACD	Q.19	AB
Q.20	AC	Q.21	ABCD			Q.22	AD	Q.23	ABC	Q.24	C		
Q.25	(A) T ; (B) P; (C) S ; (D) R					Q.26	(A) P; (B) R; (C) S						
Q.27	7	Q.28	0	Q.29	27	Q.30	1	Q.31	19	Q.32	44	Q.33	1745
Q.34	6	Q.35	50	Q.36	25	Q.37	3	Q.38	48	Q.39	5	Q.40	47

EXERCISE-3

Q.1	D	Q.2	D	Q.3	A	Q.4	A	Q.5	**D**

EXERCISE-4

Q.1	C	Q.2	B	Q.3	B	Q.4	D	Q.5	B	Q.6	AB	Q.7	CD
Q.8	2	Q.9	3	Q.10	D	Q.11	7	Q.12	C	Q.13	CD		

EXERCISE-5

Q.1	A	Q.2	D	Q.3	B	Q.4	A	Q.5	B	Q.6	B	Q.7	B
Q.8	D	Q.9	B	Q.10	A	Q.11	D	Q.12	AD	Q.13	AD	Q.14	ABD

Q.15 ABC

Q.16 (A) S; (B) P; (C) Q; (D) P, R

Q.17 (A) Q; (B) R; (C) T; (D) P

Q.18	7	Q.19	1024	Q.20	1	Q.21	16	Q.22	6	Q.23	10	Q.24	32

Q.25 0 Q.26 1 Q..27 $\frac{1}{2}$ Q.29 $\frac{1}{2} \le a \le 1$

Q.30 A = 45º, B = 60º, C = 75º Q.35 $\frac{\sqrt{3}-1}{2}$ Q.36 56